EV Charging Analyzer / Simulator

for conductive charging of Electric-Vehicles – Analysis according to IEC 61851 and SAE J1772

Successfully tested premium charging station with electric vehicle, uninterrupted charging.

Developments for e-mobility presents new challenges for vehicle- and charging-system manufacturers. Through a high availability of the 230V AC main power supply, conductive charging systems for electric vehicles are widely spread. The quiet young standard IEC 61851 and SAE J1772 describe the requirements on AC-charging-systems, electrical waveforms and the pilot signal to control the charging process. By combining electric vehicles and charging systems of various manufacturer, different system-tolerances and disturbing influences may occur. The causes of charge interruptions are very difficult to locate due to the long charging.

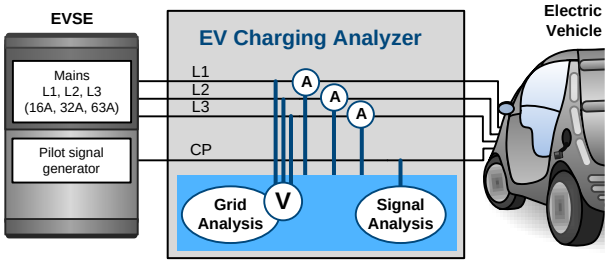
The comemso EV Charging Analyzer / Simulator measures and verifies both the communication and the load circuit on standard-conformity over the complete duration of charging and records all deviations.

Thus causes of charge interruptions can not only be identified but also causalities of events can be represented and visualized.

NEW:

- **Functional extention to DC charging (option 2)**
- **PLC extention with Vector Tools, also as Gateway (option 3)**

Verification Charging and Grid Quality



Highlights

- Analysis according IEC 61851-1 charging mode 1, 2 and 3 & SAE J1772
- Long-term analysis of the entire charging-process
- Analysis of load circuit in voltage, current, frequency, capturing of harmonic interferences up to 5kHz
- Analysis of pilot signal and its entire parameters
- Acting as PLC tracer (trace SLAC, V2G messages) with real measured AC/DC current and voltage on same time stamp
- High accuracy measurement methods, developed especially for analysis of electrical signals described in IEC 61851-1
- Galvanic isolated pilot signal for verification by oscilloscope
- Measurement data recording to USB storage media or over CAN interface (e.g. to CAN data logger / notebook)
- Real-time analysis over CAN Bus possible
- CAN-remote-control possible (user specific tests)
- Integrated short tests und sequence tests for EVSE and EV (EV tests only with *option 1 „EV test hardware & software“* possible)
- Comprehensive EVSE simulation for EV tests on pilot signal possible (Duty cycle, frequency, voltage granular adjustable)
- Calculation of Power (W) and Energy (Wh) for L1, L2, L3 based of TrueRMS measurement of voltage and current
- Arbitrary use of connectors and adapters for different charging systems and use-cases
- Robust casing for mobile outdoor use - IP67, Battery Powered

Contact for more informations:

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EV Charging Analyzer / Simulator

for conductive charging of Electric-Vehicles – Analysis according to IEC 61851 and SAE J1772

The EV Charging Analyzer is the technical standard in the analysis of the e-Mobility charging process:

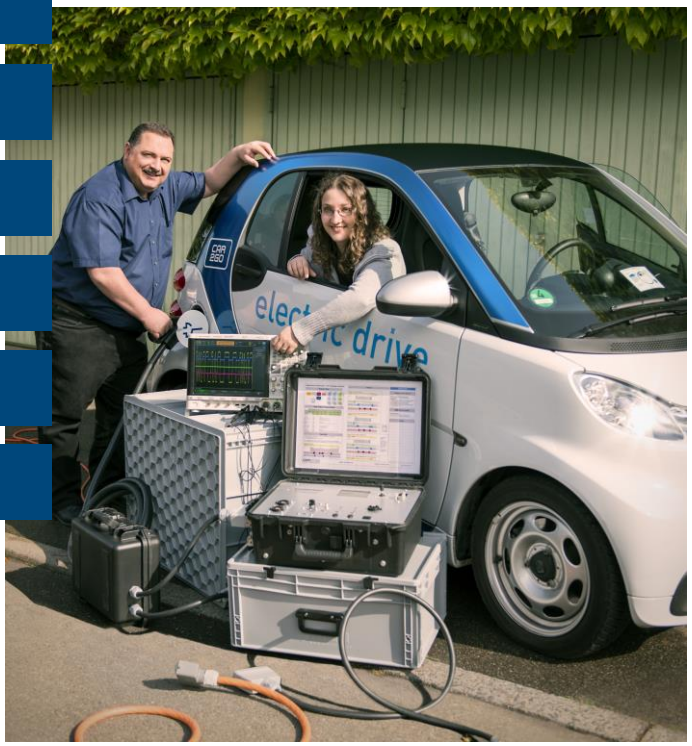
- **Leading measurement technology in the field of the charging system analysis**
- **Capture of voltage + current of the load circuit AC / DC**
- **Identification of permitted current, which is communicated via CP / PLC and synchronously comparable with real current flow in the load circuit**
- **No oscilloscope required! Hard real-time and automated testing for compliance with standards of the control pilot signal in each period across hours.**
- **Causes of charge interruptions or damages of components can be detected and logged, e.g. on "intolerance" of an electric vehicle with a specific charging station**

Analysis DC charging with PLC (Option 2 and 3)

- **Functional unit tests (EV test / EVSE test)**
- **Large number of available connectors / adapters**
- **Modular expansion options**
- **Convenient data acquisition and analysis over time**
- **Intuitive handling / Easy test automation**
- **At premium EV / EVSE manufacturers successfully in use**

Successfully tested at Joint Research Centre of the European Commission in Ispra / Italy, even under extreme conditions (e.g. in climatic chamber at -25 ° C)

Successfully tested worldwide (Europe, USA, Asia, cold and hot country testing)



comemso EV Charging Analyzer:
Lossless load circuit and communication analysis, automated & logged.
As man-in-the-middle, or as EV test / EVSE test.
No oscilloscope can do this!

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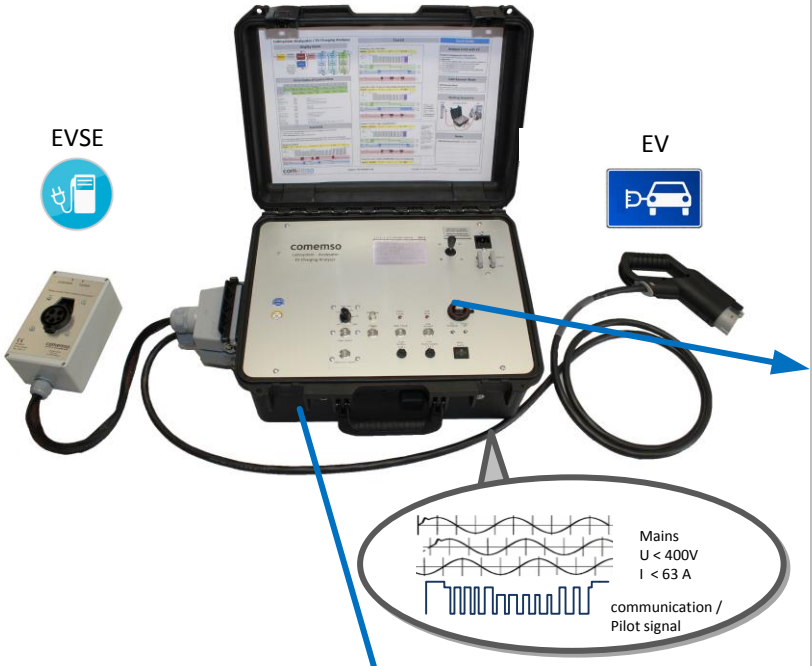
EV Charging Analyzer / Simulator

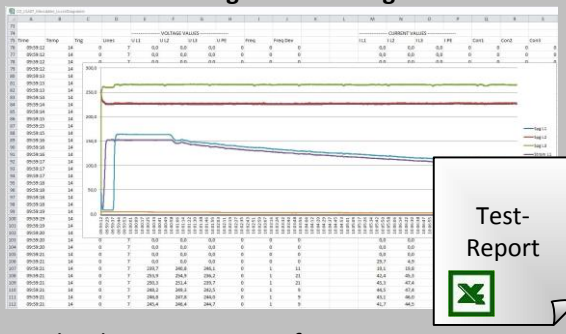
Measurement data recording, usage & visualization

EV Charging Analyzer
as Man-in-the-middle



Measurement data recording

Variant A: recording to USB storage media

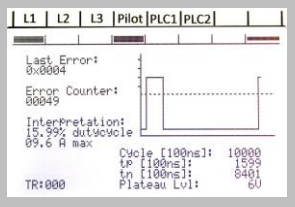


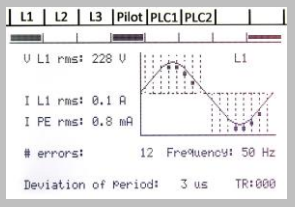
- Clearly presentation of measurement results in Microsoft® Excel®.
- Full automatically generation of diagramms with the aid of macros for the presentation of the measurement results over time.
- Tiny software – can be sored on USB media together with measurement data

Microsoft and Excel are registered trademarks of Microsoft Corporation in the United States and other countries.

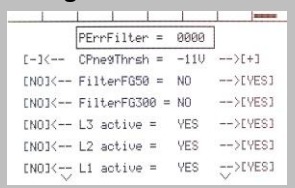
Real-time visualization

at display



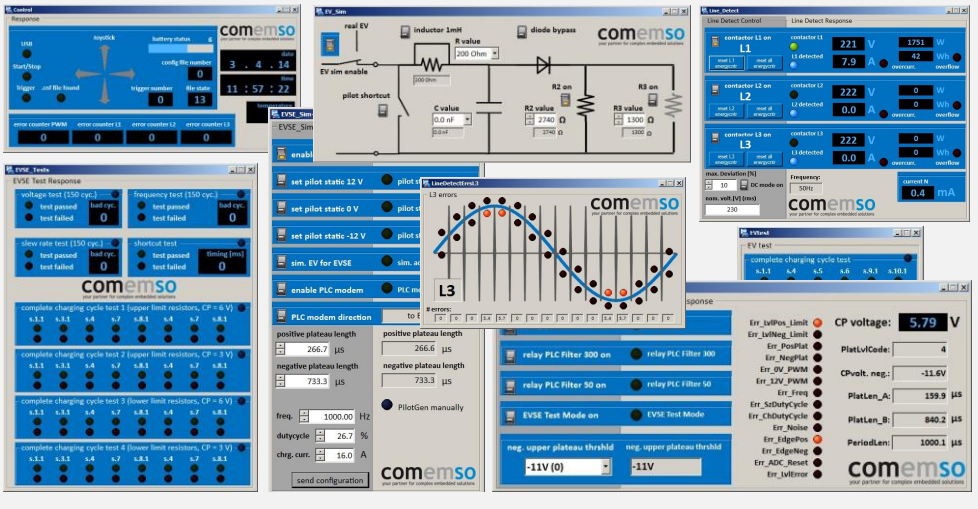


Configuration



Real-time User Interface

Variant B: recording and control over CAN interface
DBC-file, project-configuration and control panel for Vector CANoe can be ordered from comemso



comemso_LSA_Flyer_2015_04_22_eng.pdf

elektromobilität süd-west
GEFÖRDERT VOM Bundesministerium für Bildung und Forschung
INVENTED IN GERMANY

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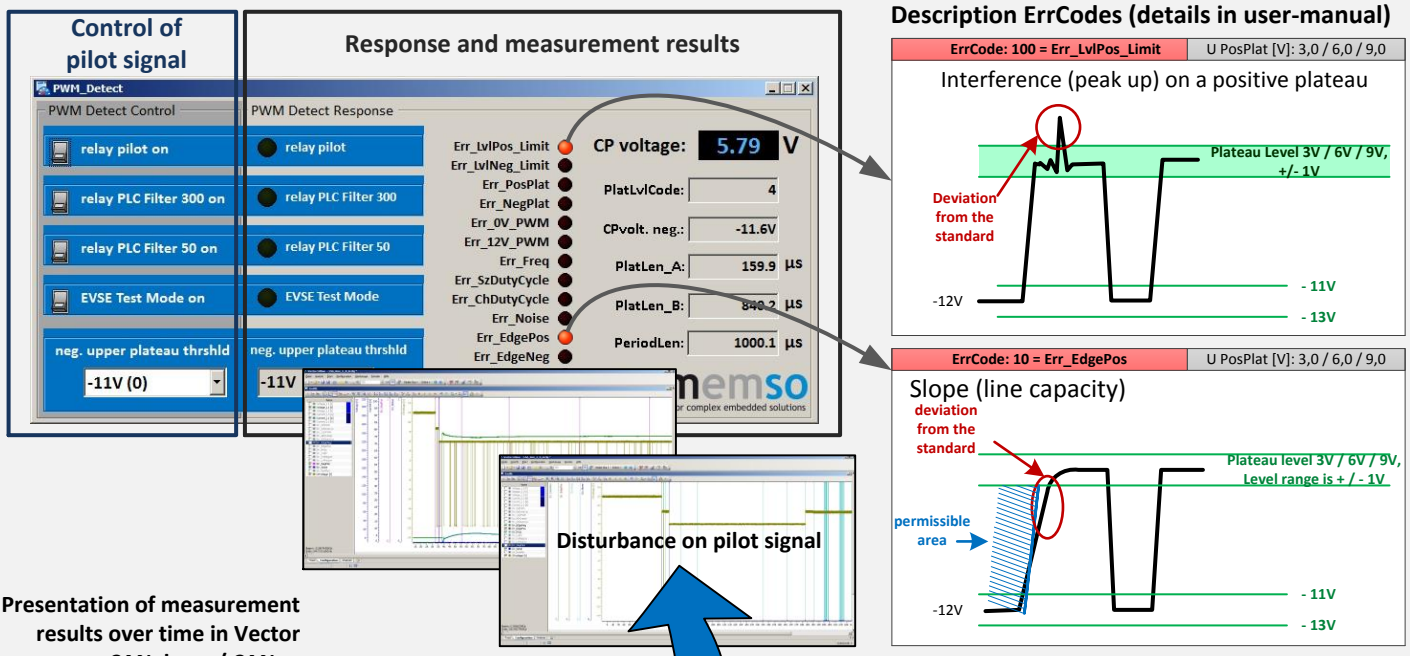
EV Charging Analyzer / Simulator

Measurement Data Analysis online / offline **with Vector CANoe**

Pilot Signal



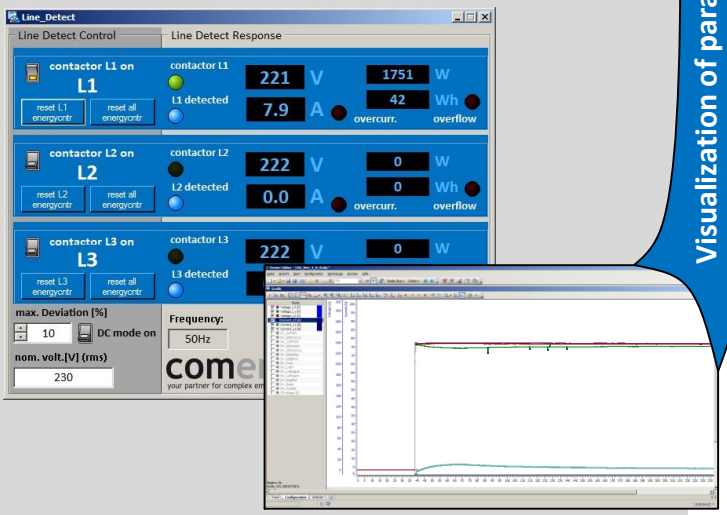
Description ErrCodes (details in user-manual)

ErrCode: 100 = Err_LvlPos_Limit
U PosPlat [V]: 3,0 / 6,0 / 9,0
Interference (peak up) on a positive plateau
Plateau Level 3V / 6V / 9V, +/- 1V
Deviation from the standard
-12V
- 11V
- 13V
ErrCode: 10 = Err_EdgePos
U PosPlat [V]: 3,0 / 6,0 / 9,0
Slope (line capacity)
deviation from the standard
Plateau level 3V / 6V / 9V, Level range is + / - 1V
permissible area
-12V
- 11V
- 13V

Presentation of measurement results over time in Vector CANalyzer / CANoe

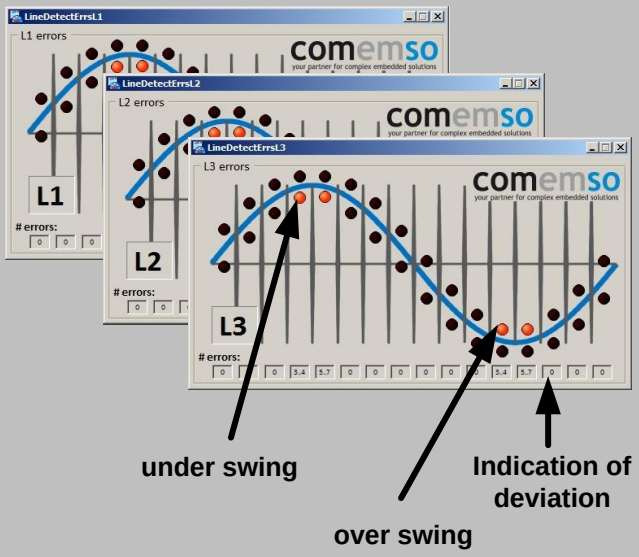
Visualization of parasitic coupling

Mains



Presentation of measurement results over time in Vector CANalyzer / CANoe

Grid Quality (L1, L2, L3)



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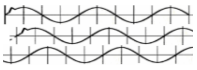
EV Charging Analyzer / Simulator

Simulation of EVSE (Test EV of limits, robustness) + DC / PLC Gateway

Option 1

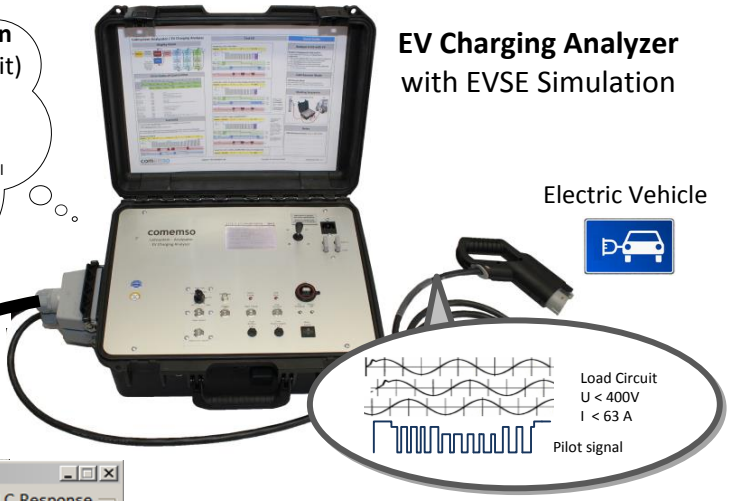
EVSE simulation for EV test

AC source to the load circuit:
- Real charging station
- EVCA Source Adapter
- EVCA power plugs for different currents / types of country



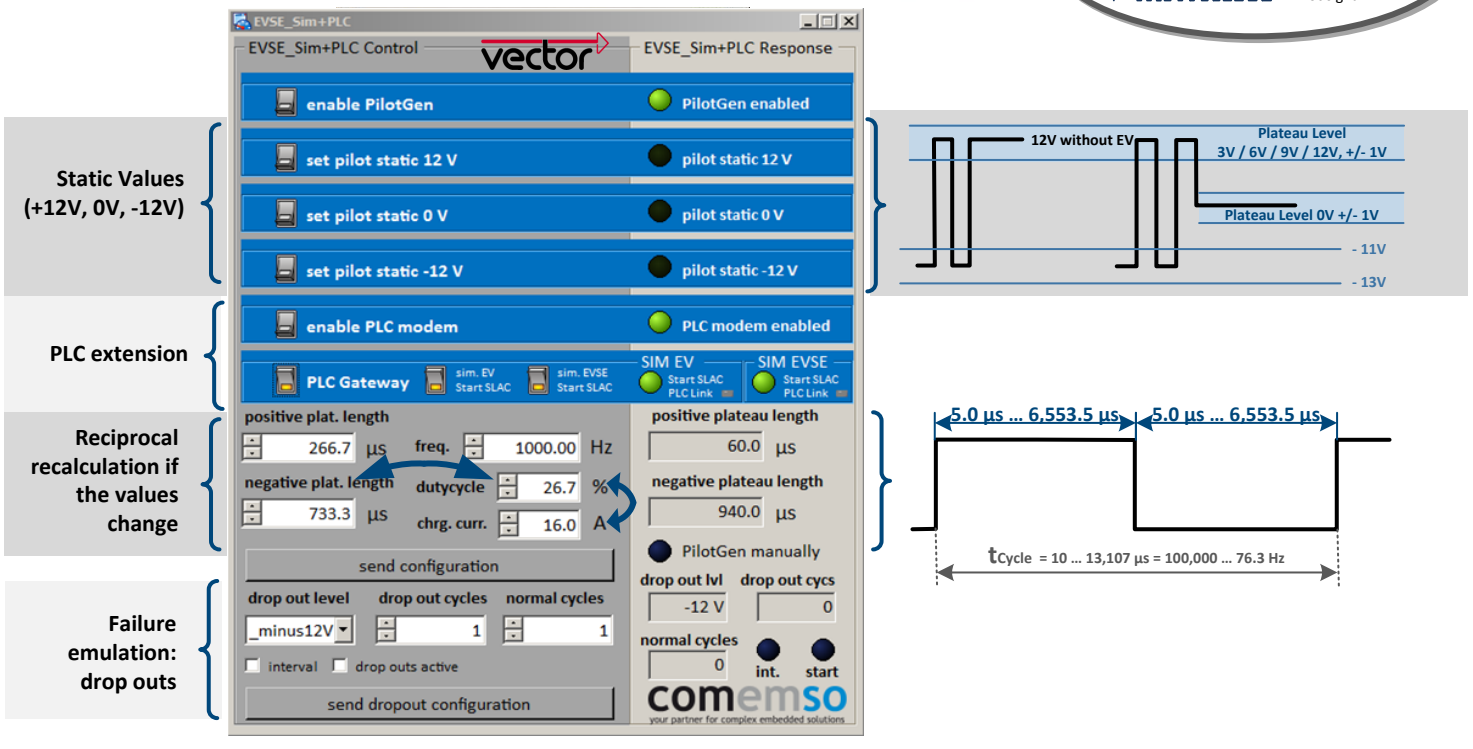
→ Test with disturbed AC source e.g. with grid emulator

Simulation of Charging Station
(C-Pilot, controlling Load Circuit)



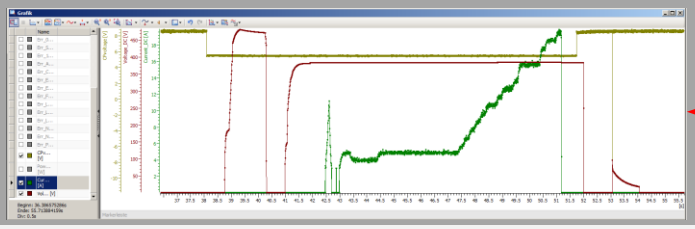
EV Charging Analyzer
with EVSE Simulation

Electric Vehicle



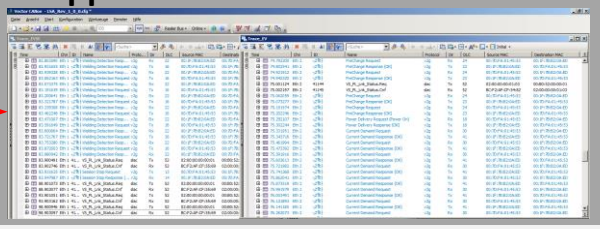
DC measurement + PLC Gateway

Measure
DC voltage + DC current + CP



Same time base!

Tracing PLC
supported with vector SCC add-on



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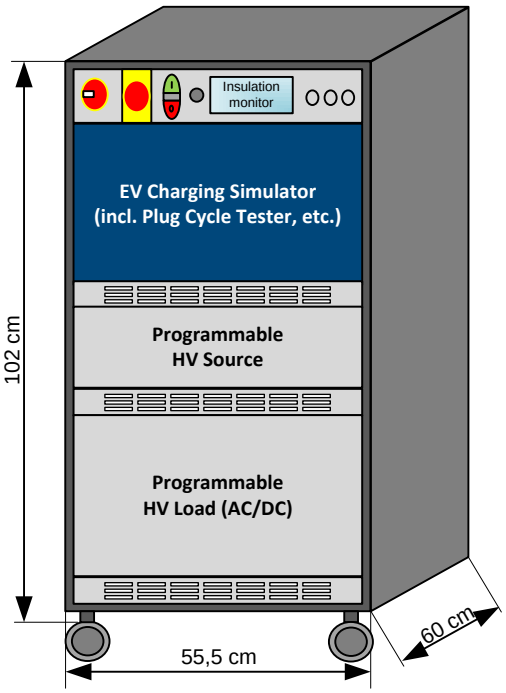
EV Charging Analyzer / Simulator

19“-Variant for Test Bench at Lab

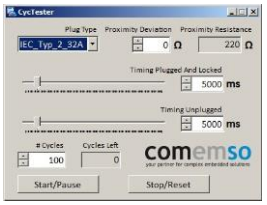


- Unit and system tests for EV / EVSE in the laboratory
- Identical to field version of EV Charging Analyzer
  → interchangeable test routines and control settings at Vector CANoe
- Modular expansion options e.g. DC Charging, PLC, etc.
- Remote schwitchable between AC and DC charging
- Customer-specific HV source / AC and DC HV load, integratable with remote control
- Optional extendable with further test automation tools, e.g. comemso EV Plug Cycle Emulation, Vector VT System, etc.
- Fully integrated in Vector CANoe / vTESTstudio for test automation

OPEN TEST ROUTINES, EXPANDABLE BY EVERYBODY, FULL TRANSPARENCY!!!

Change of PP resistor (Proximity Pilot):

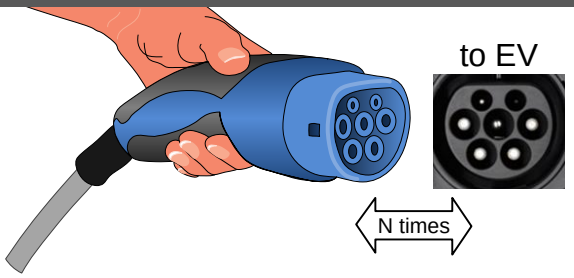
comemso Art.No.: 501013



with Vector CANoe Panel

EV Plug Cycle Emulator (option 4)

- Emulation of cyclic plug tests, with tracing of Control Pilot data and Load Circuit through EV Charging Analyzer.
- Change of PP resistor values (resolution 1 Ohm)
- For EV side, optional as variant for EVSE side



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EV Charging Analyzer / Simulator

Charging cable & adapter for analyzing charging, measurement and recording

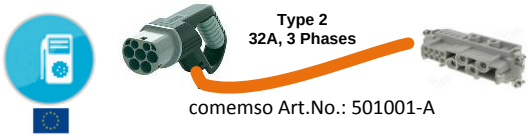
Verification Charging (Man-in-the-Middle)

Listen

Gateway for PLC Analysis

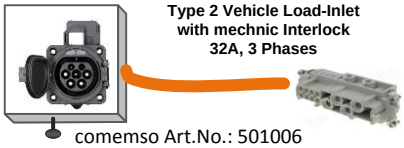
AC Standard Cable

Type 2



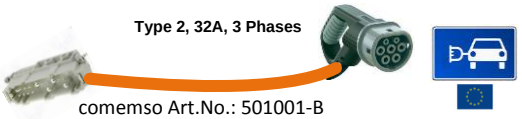
Type 2
32A, 3 Phases

comemso Art.No.: 501001-A



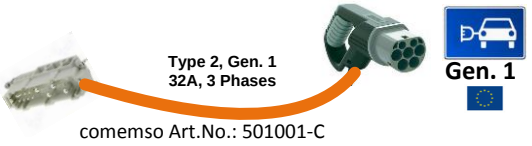
Type 2 Vehicle Load-Inlet
with mechnic Interlock
32A, 3 Phases

comemso Art.No.: 501006



Type 2, 32A, 3 Phases

comemso Art.No.: 501001-B

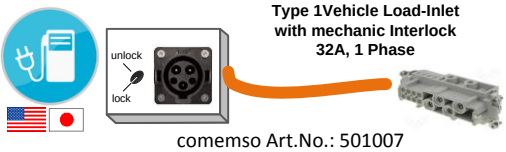


Type 2, Gen. 1
32A, 3 Phases

Gen. 1

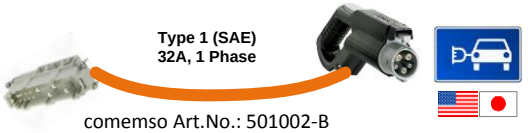
comemso Art.No.: 501001-C

Type 1



Type 1Vehicle Load-Inlet
with mechanic Interlock
32A, 1 Phase

comemso Art.No.: 501007



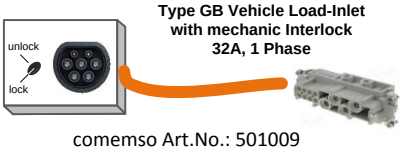
Type 1 (SAE)
32A, 1 Phase

comemso Art.No.: 501002-B

Type GB/T (China)

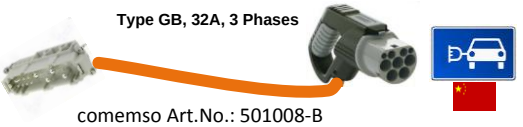
Type GB
32A, 3 Phases

comemso Art.No.: 501008-A



Type GB Vehicle Load-Inlet
with mechanic Interlock
32A, 1 Phase

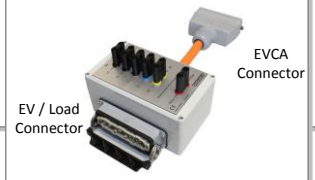
comemso Art.No.: 501009



Type GB, 32A, 3 Phases

comemso Art.No.: 501008-B

EVCA Measure Adapter



comemso Art.No.: 501410

DC adapter (option 2)

Type 2 Combo, EVSE Socket
and EV Plug
850V, 125A, 1 DC Phase

comemso Art.No.: 501016

Type 1 Combo
EVSE Socket and EV Plug
600V, 174A, 1 DC Phase

comemso Art.No.: 501017

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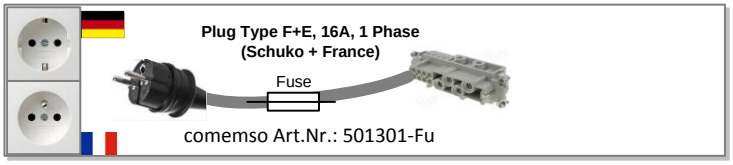
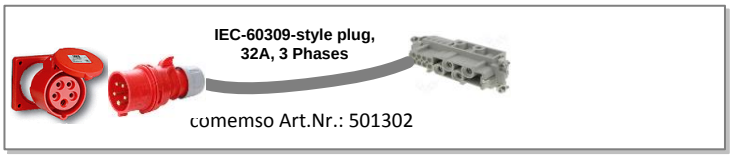
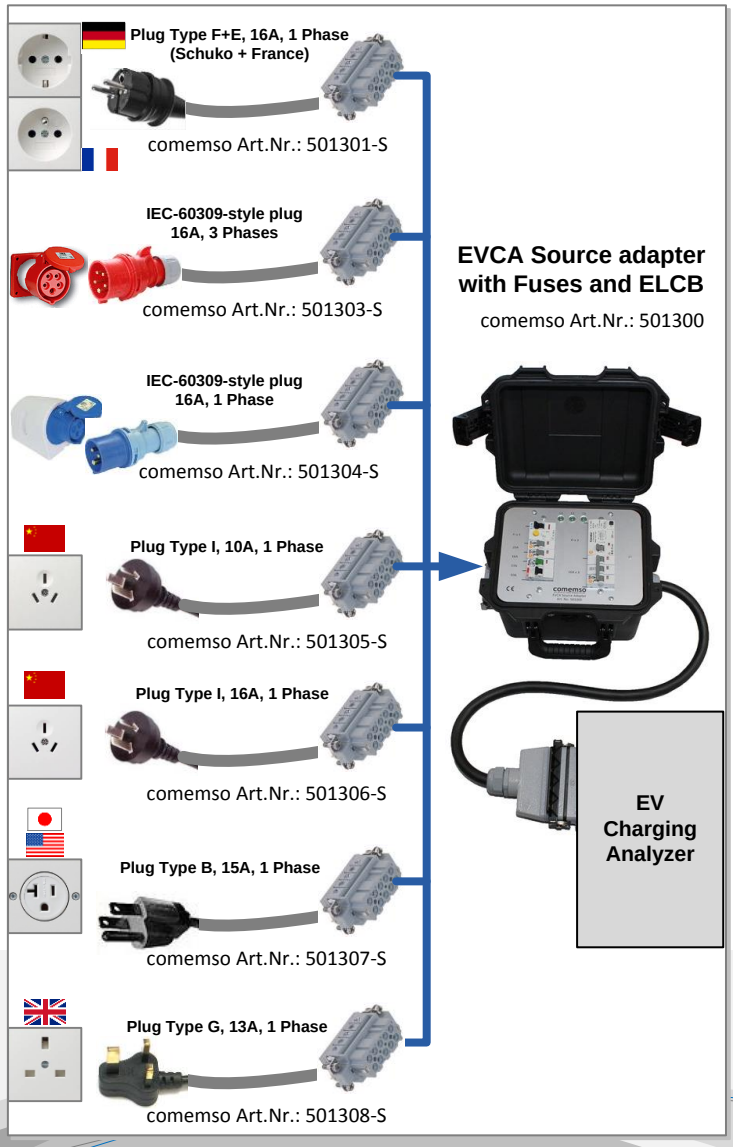
EV Charging Analyzer / Simulator

Charging cable & adapter for testing of EV or EVSE

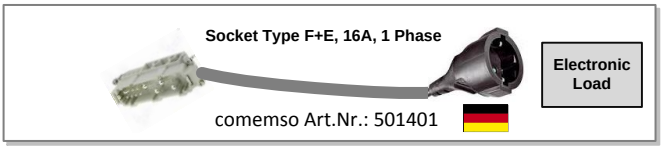
EV Test

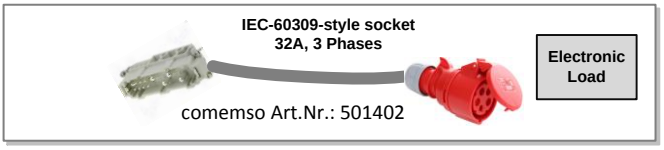


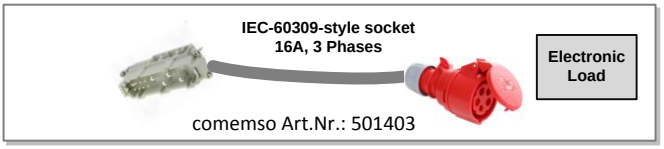


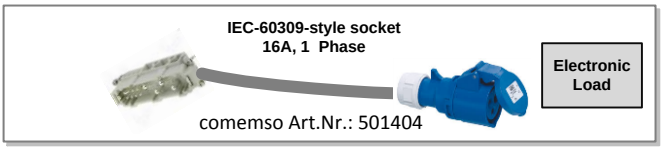


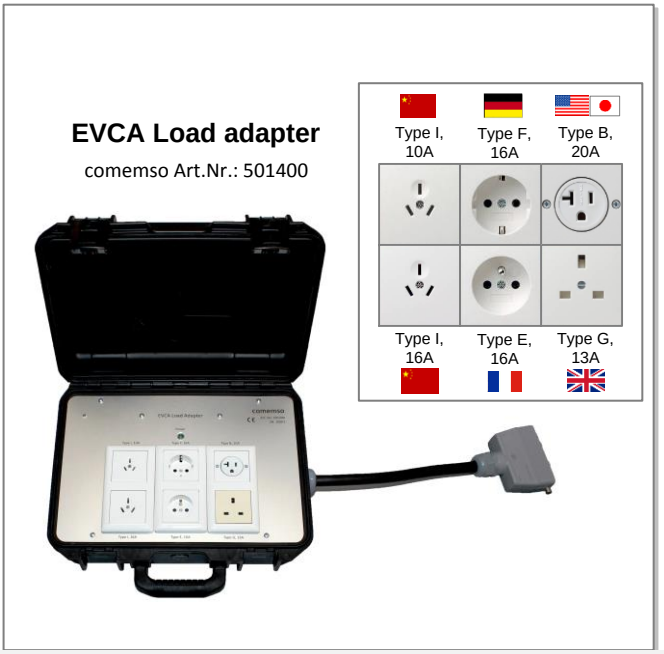
EVSE Test











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EV Charging Analyzer / Simulator

for conductive charging of Electric-Vehicles – Analysis according to IEC 61851 and SAE J1772

Technical Data

General

AC Power Supply Voltage:	110 - 230 VAC, internal 24 VDC Battery
Weight:	15 kg
Size (L x W x D):	520 mm x 390 mm x 230 mm
Operating Temperature:	-20 … +60 °C (without Display/Battery)
USB Interface:	USB 2.0, file system FAT16
CAN Interface:	CAN Gateway for Remote Mode, 1MBit/s
Test / Analyze Standards:	**E DIN EN 61851-1 2013-04, SAE J1772**
Supported EV Charging:	Conductive
EV Charging Power	AC 120V / 230V / 240V split phase. up to 3 Phases, separately switchable.
EV Charging Current	Up to 49,9A. If supplied with 50A at a duration of 1 sec, the load circuit is disconnected by EV Charging Analyzer. Internal cabling for 63A.
EV Charging Frequency	50 / 60 Hz

Measurement recording on USB interface

Control Pilot

Recording of state messages on USB interface:	max. 200 messages/s (max. each 5ms)
Recording of error messages without data loss on USB interface:	max. each 700 µs for about 1 s

Load Circle

Recording of state and error messages:	at 50Hz mains: max. 250 messages/s at 60Hz mains: max. 300 messages/s (messages for L1 .. L3 per sinus cycle)

Measurement recording on CAN interface

Output of pilot data:	max. each 700 µs
Recording of state and error messages	at 50Hz mains: max. 250 messages/s at 60Hz mains: max. 300 messages/s (messages for L1 .. L3 per sinus cycle)

Measurement Range, Accuracy, etc.

Control Pilot Signal

Cycle of measurement and CAN send:	each cycle of PWM signals (700 µs …2 ms)
Resolution of timing: measurement:	100 ns (Pulse and pause of PWM signal)

Pilot Voltage:

• Range	+/- 13,8 V
• Accuracy	+/- 100 mV
• Resolution	7,463 mV
• Protocol Resolution: CAN	7,463 mV
• Protocol Resolution: USB	100 mV

Load Circle

Line Voltage:

• Range	10 .. 480 VAC; 0 .. 900 VDC
• Accuracy	+/- 1 V, True RMS, per line 100 measurement points
• Resolution	14,648 mV
• Protocol Resolution: CAN	1 V
• Protocol Resolution: USB	1 V
• Deviation to period	+/-128 µs Range 1 µs Resolution

Line Current:

• Range	0 .. 58.8 A (AC); 0 .. 200 A (DC)
• Accuracy	+/-100 mA(AC), +/-200mA(DC) True RMS, per line 100 measurment points
• Resolution	1,795 mA
• Protocol Resolution: CAN	100 mA
• Protocol Resolution: USB	100 mA

Residual Current (FI):

• Range	0 .. 310 mA
• Accuracy	+/- 1 mA
• Resolution	9,466 µA
• Protocol Resolution: CAN	100 µA
• Protocol Resolution: USB	100 µA

EV = Electric Vehicle, EVSE = Electric Vehicle Supply Equipment, EVCA = EV Charging Analyzer

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your partner for complex embedded solutions

EV Charging Analyzer / Simulator

please mark with a cross

Request a quotation:

AC Standard Cable to EVSE

- Type 2, 32A, 3 Phases — Art.No.: 501001-A
- Type 2 Vehicle Inlet with mechanic Interlock 32A, 3 Phases — Art.No.: 501006
- Type 1 Vehicle Inlet with mechanic interlock 32A, 1 Phase — Art.No.: 501007
- Type GB 32A, 3 Phases — Art.No.: 501008-A
- Type GB Vehicle Inlet with mechanic Interlock 32A, 1 Phase — Art.No.: 501009
- Type 2 32A, 3 Phases, without PP Resistor — Art.No.: 501005-A
- Type 2 Vehicle Inlet 32A, 3 Phases, with PP line — Art.No.: 501006-p

EV Charging Analyzer mobile outdoor system

Art.No.: 501010-c

EV Charging Analyzer for test bench 19"

Art.No.: 501010-r

EVCA Measure Adapter

Art.No.: 501410

Option 4

Plug Cycle Emulator / Emulation PP Resistor

Art.No.: 501013-B

AC Standard Cable to EV

- Type 2, 32A, 3 Phases — Art.No.: 501001-B
- Type 1 (SAE) 32A, 1 Phase — Art.No.: 501002-B
- Type GB, 32A, 3 Phases — Art.No.: 501008-B
- Type 2, 32A, 3 Phases, without PP Resistor — Art.No.: 501005-B
- Type 1 (SAE) 32A, 1 Phase, without PP Resistor — Art.No.: 501004-B
- Type GB, 32A, 3 Phases, without PP Resistor — Art.No.: 501010-B

DC Charging / Power Line Communication (PLC)

Option 3

HW & SW Extension: PLC (EV and EVSE)

with Vector Tools also as Gateway between EV and EVSE

Art.No.: 501014

Option 2, Type 2

Art.No.: 501016-c

DC Adapter
Type 2 Combo,
EVSE Socket and EV Plug
850V, 125A, 1 DC Phase

Option 2, Type 1

Art.No.: 501017-c

DC Adapter
Type 1 Combo,
EVSE Socket and EV Plug
600V, 125A, 1 DC Phase

EV Test (Simulation EVSE)

- Plug Type F+E, 16A — Art.Nr.: 501301-S
- IEC-60309-style plug, 16A, 3 P — Art.Nr.: 501303-S
- IEC-60309-style plug, 16A — Art.Nr.: 501304-S
- Plug Type I, 10A — Art.Nr.: 501305-S
- Plug Type I, 16A — Art.Nr.: 501306-S
- Plug Type B, 15A — Art.Nr.: 501307-S
- Plug Type G, 13A — Art.Nr.: 501308-S

EVCA Source adapter with Fuses and ELCB
Art.No.: 501300

EV Charging Analyzer

Option 1

HW & SW Extension: EVSE Simulation (CP generation)

manually + CAN remote

Art.No.: 501011

- Fuse — Art.Nr.: 501301-Fu — Plug Type F+E, 16A, 1 Phase (Schuko + France)
- Art.Nr.: 501302 — IEC-60309-style plug, 32A, 3 Phases
- Fuse — Art.Nr.: 501304-Fu — IEC-60309-style plug, 16A, 1 Phase
- Fuse — Art.Nr.: 501306-Fu — Plug Type I, 16A, 1 Phase
- Fuse — Art.Nr.: 501307-Fu — Plug Type B, 15A, 1 Phase

EVSE Test

- Socket Type F+E, 16A, 1 Phase — Art.No.: 501401 — Electronic Load
- IEC-60309-style socket 32A, 3 Phases — Art.No.: 501402 — Electronic Load
- IEC-60309-style socket 16A, 3 Phases — Art.No.: 501403 — Electronic Load
- IEC-60309-style socket 16A, 1 Phase — Art.No.: 501404 — Electronic Load

EVCA Sink adapter: Suit-case with international sockets

Art.No.: 501400

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